

Mapping impacts of open innovation practices in a firm competitiveness

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Abstract: This manuscript aims to understand how it is possible to improve the competitiveness of a company using open innovation practices and presents evidences that open innovation can be practice, especially regarding technologies adoption and actions involving partnerships and collaboration. The paper concludes, base in a case study of a ICT firm, that even with a partial degree of openness and an intermediate level of maturity, open innovation put into practice have contributed to technological development and increase company competitiveness in its activity sector. It also pointed out challenges in execution capacity, internal process improvements and partnership relations, but mainly challenge is breaking cultural barriers in open innovation implementation. Finally, a set of recommendations were proposed to expand actions based on open innovation management, upgrade innovation maturity level and increase competitive potential of the companies.

Keywords: open innovation; disruptive innovation; competitiveness; ICT.

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Introduction

Nowadays consumer market is increasingly competitive and many companies have been trying to innovate in products, services and business models in search of a competitive edge. Globalization is already a reality and carries at its core the principle of competitiveness among companies and maximum exploitation of the economic system (Hitt, Ireland and Hoskisson, 2012). Thus, innovation becomes a means to create and maintain sustainable competitive advantages, being considered a key element of business success (Johannessen, Olsen and Lumpkin, 2001). Innovation has been widely discussed in business environment because, due to speed with which business has been transformed in recent years, companies that reinvent themselves and innovate their business models are likely to be those that will sustain themselves in the market in the medium and long term. The idea about innovation is directly linked to the concept of something new, be it transformed into product or service (Bessant and Tidd, 2007).

Merging competitiveness and innovation themes, as well as their correlation, is not a recent study target. At beginning of 20th century, Henry Ford already investigated the modification of production model seeking maximum system efficiency and effectiveness (Maximiano, 2000). Recently, giant companies such as Kodak, even with all its history and technological arsenal, were unable to reconcile their innovative vein with the need for a business model re-evaluation and ended up not stay in the market (Mui, 2012). In contrast, other companies, such as IBM, have repositioned themselves to remain competitive (Harreld, O'Reilly and Tushman, 2007). In parallel to this competitiveness evolution scenario, a innovation management model called Open Innovation (OI) emerged, which can be understood as a model of innovation management based on the use of internal and/or external efforts for the new technologies development (Porto, 2013).

This manuscript proposes to evaluate several issues of innovation environment in a firm and, based on a case study of a Brazilian ICT

company, it tries to respond the following question: "Is it possible to improve the competitiveness of an ICT company using open innovation?". Answering this question, it is expected to assist future researches about open innovation and encourage companies to adopt and implement an innovation model more open and collaborative towards a better business competitiveness.

Review

Competitive strategy

The concept of strategy is old and originally military, it was simply a high-level plan to compete and achieve one or more objectives in uncertainty conditions (Freedman, 2015). Strategy can be also defining as a system for finding, formulating, and developing a doctrine that will ensure long-term success if followed faithfully (Kvint, 2010). Therefore, strategy usually involves setting goals, determining actions to achieve goals, and mobilizing resources to perform actions. It also involves activities such as planning and strategic thinking.

In strategic planning, companies must establish their competitive advantages that will enable them to achieve their strategic objectives. Different strategy studies look for ways to guide companies on competitive advantages definition. The classic concept of competitive strategy published by Porter (2008a) still applies today and is applied in several organizations, based on strategies for differentiation, total cost leadership or focus (niche). Even in their most recent studies, Porter (2008b) approach to competitive strategy considers factors that add competitive advantage, such as bargaining per purchasing power, monitoring new entrants and replacing products and services, but does not explicitly consider as essential to competitive strategy.

An alternative approach to competitive strategy is proposed by Prahalad and Ramaswamy (2003) when they point out that the next innovation practices must completely change the way products and services are created and competition between companies. Tidd, Bessant

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and Pavitt (1997) also point out that innovation contributes in several ways to increasing firm's competitive advantage, including research that suggests a strong correlation between market performance and new products insertion.

In this way, it can be observed that researchers share opinions about main variables that can enhance companies' competitive capacity, but it is fact that innovation, directly or indirectly, is an additional ingredient that drives companies to grow and sustain themselves in the market over time. Analyzing effects of innovation on company strategy and performance, for firms that are driven by barriers to entry and customer needs anticipation, innovation skills can help company to guarantee long-term competitiveness (Reed, Storrud-Barnes and Jessup, 2012).

Open Innovation

The discussion about the innovation concept is a recurring theme in several knowledge areas and has been improving recently. Thus, from seminal proposition on innovation as "new combinations" by Schumpeter (1996) which determine economic development, other definitions improve innovation concept and extended the concept of product and process innovation to encompass market and organizational innovations with new business models (Tidd, Bessant and Pavitt, 2008; Oslo, 2005; Hales, 1998). Norman and Verganti (2014) present two innovation dimensions (technology and business model), classifying innovation in four types: Market-Pull, Technology-Push, Meaning-Driven and Technology Epiphanies. Market-Pull innovation builds on existing business models and technologies and is therefore only a form of incremental innovation based on simple market needs. Technology-Push innovation has a semi-radical nature because despite being applied to an already existing business model, it inserts a technology innovation that was previously undeveloped. Meaning-Driven innovation, also categorized as semi-radical, starts from understanding sociocultural aspects and results in new business models with new meanings and values. Technology Innovation Epiphany brings a disruptive (radical) change.

Another way to classify innovations are: product and service innovation, process innovation, position innovation and paradigm innovation (Tidd, Bessant, Pavitt, 1997; Hales, 1998). Basically, product innovation is based on introduction of products or services with the use of new knowledge and technologies or even existing knowledge and technologies. Process innovation refers to introduction of a new process or significant improvements that aims to reduce costs, lead times or improve quality. Position innovation proposes to introduce new marketing methods, involving significant changes in the design, packaging, distribution, promotion or price of the product (Tidd, Bessant, Pavitt, 1997). On the other hand, paradigm innovation, also known as organizational innovation, introduces new business or organizational models whose goals are to improve organizational performance, reduce costs or increase customer satisfaction.

Per results, the innovations can still be classified as being incremental or radical. Incremental innovations can be understood as an adaptation, refinement, or continuous improvement of something

pre-existing. On the other hand, radical or disruptive innovations have a discontinuous and highly positive impact, materializing in completely new products and processes with high market acceptance (Freeman and Perez, 2000).

Another relevant characterization concerns innovation management model which can be defined as "closed" or open. Open innovation (OI) is often contrasted with closed innovation where firms generate their own ideas of innovation, and then develop, build, market, distribute, finance and support themselves (Chesbrough, 2006a). Open innovation, on the other hand, proposes to open the entire innovation process of the organization, both to give away ideas and innovations not used as well as to assimilate technologies and external opportunities adhering to the business. Thus, it can be said that open innovation is a broad concept that encompasses different dimensions and with internal and external focus (Mortara et al., 2009).

Most of studies associate open innovation with the processes of intentional knowledge output or input and technology to innovation accelerate processes and to better benefit the innovative efforts (Chesbrough, Vanhaverbeke, 2006; Chesbrough, 2006b). Regarding the technology output process, also known as technology exploitation or inside-out process, Van de Vrande et al., 2009 states that for better use of internal knowledge, companies can engage in various innovation practices. The three activities related to technology output are: venturing, licensing of intellectual property (IP), and involvement of non-R&D workers in innovation initiatives (Chesbrough, 2006a; Van Dijk, Van Den Ende, 2002; Gassmann, 2006; Lichtenthaler, 2007). The technology input process, also called technology exploration or outside-in, refers to the activities that allow companies to acquire new knowledge and technologies outside organization boundaries. Among five main forms related to this technology exploitation are: customer involvement, external network capitalization, external participation, outsourcing R&D and licensing (acquisition) of intellectual property (Van de Vrande et al., 2009; Gassmann, 2006; Von Hippel, 2009).

Open innovation implementation

In a completely open environment, companies combine these two categories of practices: both outside-in and inside-out, to create maximum value from their technological capabilities or other skills (Chesbrough, Crowther, 2006; Lichtenthaler, 2008). This may be the biggest organizations challenge: to make their technological development environments fully open. The concern with usability of innovation management model has already been object of empirical studies in multinationals firms like Lucent, 3Com, IBM, Intel and Millennium Pharmaceuticals (Chesbrough, 2006a).

Other studies on open innovation practice have also been applied to small and medium-sized enterprises (SMEs) and found that this company profile also uses such an innovation management model for market-related reasons such as meeting customer demands or maintaining (Van de Vrande et al., 2009; Lee et al., 2010). Chaston and Scott (2012) analysed performance of companies in Peru in relation to entrepreneurial orientation and involvement in open innovation,

verified a higher sales growth, and indicated a greater confidence in the use of knowledge management through outside-in and inside-out OI processes. Specifically, in Brazil, Ades et al. (2013) analysed open innovation implementation and main results reinforce that cultural issues are the major obstacle to its implementation.

A Nokia case study shows a strategy based on prospecting and collaboration between partner companies through technology cooperation networks, where such networks between companies offer flexibility, speed, innovation and ability to changes in market conditions and new strategic opportunities, which can provide a great competitive advantage (Dittrich and Duysters, 2007). Even in traditional sectors such as telecommunications that mix declines in revenues and high competition level has sought competitive advantage through OI, as is the case of Deutsche Telekom (Rohrbeck, Hölzle, Gemünden, 2009).

Assuming that companies do not become totally adept at OI and often have isolated or sporadic initiatives that foster OI adoption, Ferro (2010) proposed an innovation strategy classification of firms that considers initiatives breadth and insertion of these initiatives into company's business model. This OI strategy can be classified as "full", when firms adopt initiatives for technologies input and output explicitly integrated with business model and systematized in processes and formal routines, or "potential" when firms don't have formalized processes, but that eventually has one or another initiative characteristic of OI. There are two intermediary classification "partial" and "causal", the first one which presents much openness than second one. In order to collaborate in gaps identification for OI implementation, a framework was proposed to measure OI maturity level (Enkel, Bell and Hogenkamp, 2011), combining innovation issues observed in three dimensions: climate for innovation (organization environment), partnership capacity and internal processes. Based on this approach, OI maturity of firms can be classified from initial (L1) to optimized level (L5), which this last level show the highest stage on OI maturity.

Method

This research evaluates qualitatively and exploratory (Malhotra, 2012; Godoy, 1995; Gil, 2002) issues to answer the question if is possible improve competitiveness by implementing open innovation. For this, a literature review was done to get main researches about open innovation implementation. To understand relationship between open innovation and competitive increase, a case study was adopted and it carried out in a deep and systematic way to enable a more comprehensive and detailed understanding (Gil, 2002; Yin, 2015). After literature review, this study was divided into three stages: (i) research protocol planning, (ii) data collection, and (iii) analysis and interpretation.

Stage (i) was for planning research protocol and it followed script based on Freitas and Jabbour (2011): definition of main research question; establishment of the main objective; evaluation of theoretical support themes; evaluation of potential respondents and evidence sources; definition of best period to execution and places of evidence collection; interview script summary.

Data collection (stage ii) was composed of following steps: formal contact with the organization object of study; presentation of research objectives; definition of key people to be interviewed; definition of criteria for access to company and supporting documents; evidence collection through interviews and documentary analysis. Data sources were used organizational reports, semi-structured interviews and direct observation with participation. Five interviewees in depth were held with executive professionals who work in strategic jobs in the company: R&D Specialist (R&D), R&D Manager, Innovation Management Officer, Business Marketing Director and Retail Marketing Director. Survey took place in May and June 2015 at the company headquarter.

Last stage (iii) is about analysis and interpretation of data and evidences collected. This stage consists of examining, categorizing, tabulating and recombining evidences, keeping conceptual model and initial propositions of study as references. It is a highly complex step because there are no specific standardizations for analysis and interpretation of data and evidence for this type of research (Borges, Hoppen, Luce, 2009; Prodanov, de Freitas, 2013). According to Freitas and Jabbour (2011), this step will consist in a reliable transcription of collected data, detailed description of evidences, analysis and interpretation of evidence based on main concepts, cross-evidence between different interviewees and use of content analysis technique (Flick, 2004; Bardin, 2011).

The company object in this case study operates in the information and communications technology (ICT) sector in Brazil over 60 years, has more than 3,000 employees and invoices approximately US\$ 600 million per year. Furthermore, it serving customers in different market segments: corporate, micro and small enterprises (SME) and retail in general, having a prominent position in its sector with numerous awards. For confidentiality reasons, company and interviewees names were kept in secret and we will use "Alpha" name when referring to studied company here.

Results

Innovation and organizational strategy

The Alpha company has a strategic planning model based on Balanced Score Card (BSC), implemented through software in which company's strategic objectives are defined according to BSC's perspectives (client, financial, processes and people), contribution boards, as well as performance indicators of each process and internal area. These indicators are monitored weekly by the company's executives, who clearly have a market positioning based on niche and differentiation for quality and service, thus following niche competitive strategy according to Porter (2008b). One of interviewees presented main screen of BSC dashboard, which made it possible to identify that item "innovation" is a strategic objective of the company and must support the strategies of operational efficiency, revenue generation and customer relationships. This aspect was confirmed during the other interviews in which all the interviewees affirmed to be clear that innovation is part of the strategies of the company. According to Tidd,

Bessant and Pavitt (1997), the organization also focuses on its competitive model in variables based on products, prices, suppliers, etc. It also includes innovation as a strategic variable.

Innovation indicators in company's BSC are comprised of new revenues from products under three years old, innovation expenditures and prototype risks. Company has a target of 20% new revenues originated from innovation projects and has reached this percentage in the last, but did not reveal amounts involved. Investments made with innovation have not been opened either, but company makes use of tax incentives and incentives available in its country (Informatics Law, Finep Edicts, CNPq. etc.) to finance initiatives related to innovation such as events, workshops, sponsorships, training, prototypes implementation and other actions to encourage innovation.

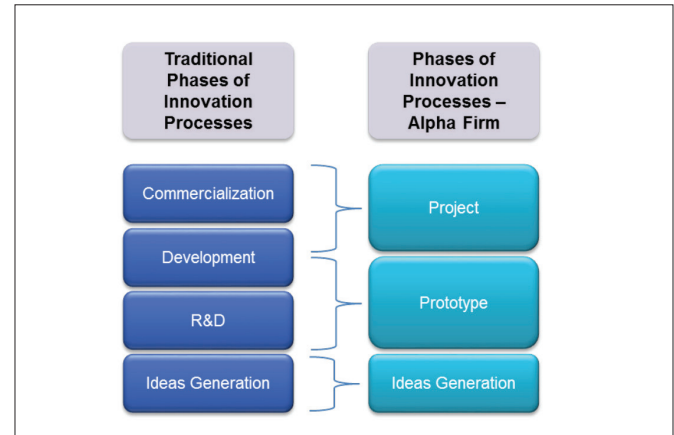
When questioned about OI concepts, it was observed that interviewees from marketing/business areas had a still in-depth knowledge and understanding about this subject. Interviewees linked directly to the innovation process dominate concepts and report that OI-based model should still be better worked and disseminated at all levels of organization.

Open innovation practices

In Alpha company, innovation processes have been working for more than 15 years. Since 2008, company sought support from a consultancy to better structure its internal processes for innovation in phases (figure 1).

Following an adaptation of innovation process traditional stages with aim of making its implementation more practical, Alpha adopts a model in which R&D phases are merged into a phase called "prototype", in which all feasibility studies as well as initial implementation of possible innovation. At this stage, innovation is tested and may incur situations of failure or non-acceptance by market. However, risk and spending up to now are small and not very relevant. Design phase is a mixture of development and commercialization of new technology, since innovation has already been successfully tested as a prototype and is capable of being reproduced on a large scale. At this stage, innovation is already treated as a business project and is now handled by project management standards and methods.

Figure 1. Innovation process phases in Alpha company



Based on this phase model, Table 1 shows a mapping of innovation instruments obtained through interviews, documents and materials available on the web, from which main evidences of possible use of OI, as well as identification of the innovation process phase and whether observed action is applied. In the same table a classification was made of which phase of internal innovation process each observed action applies, GI as generation ideas phase, PT - prototyping phase and PJ as project phase. It was also made a correlation with technologies outside-in and inside-out process commonly observed in open innovation model (Chesbrough, Crowther, 2006; Lichtenthaaler, 2008), where inside-out is identified by C, technology outside-in by A and, if action fits in inside-out and outside-in at same time, is identified by CA.

In general, it is observed that Alpha Company has more focused efforts in internal processes of idea generation and prototyping. As far as OI processes are concerned, most of actions and examples are focused on technology outside-in. The "strategic partnerships" and "support structures" actions refer to both open innovations outside-in and open-out processes, as shown in column CA of Table 1. However, such technology inside-out actions are still quite embryonic in Alpha and cannot be considered as technology inside-out in its fullness, as the process in the OI literature is defined.

Also, Alpha presented some few innovation initiatives with customer involvement, external network capture and external participation. However, it has no initiatives regarding project consortium, intellectual property licensing, corporate venture or even spin-outs, which reinforces a relevant limitation in the adoption of OI model.

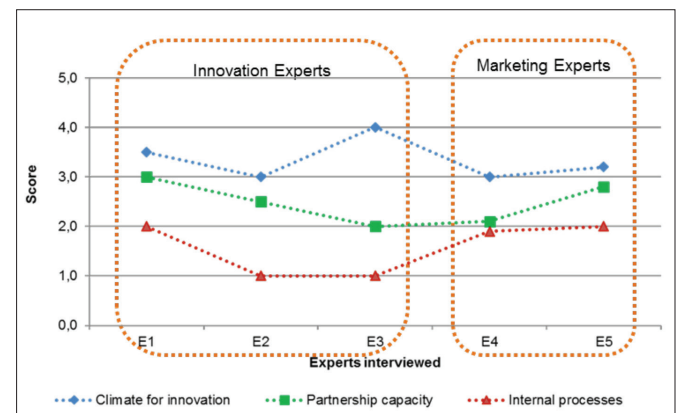
Table 1. Alpha Innovation Tools Summary

Action	Description	Examples	Open Innovation			Internal Process		
			C	A	CA	GI	PT	PJ
Events and workshops	Participation in internal and external events and workshops focused on innovation and entrepreneurship	Entrepreneurship SP, Startup Weekend, Minas Startup, Innovation Week, Innovation Show, ANPEI		★		★	★	
Executive Forums	Forums where future strategies and innovation are discussed at senior management level	Strategy Review Meeting (RAE) and forums with the participation of specialized consultants		★		★		★
Problem Solutions	Exposure of business and technology problems so that the solution is given by internal and external participants	Hackathons, pitch fights, marathons with internal and external audiences		★		★	★	
HR Development	Planning and implementing actions to develop and / or attract highly skilled young talents	Programming Marathons, Mathematical Olympiads, EADs on internal processes of innovation		★		★	★	
Market Trials	Experimental service offerings	Connected house, IPTV over Gpon, Music MVNO		★			★	★
Strategic Partnership	Establishment of alliances to develop technologies and / or business models	CPqD, Inatel, Nokia, Universities, URI-Erechim, CERTI Foundation, TeleStax, IBM, 100 Open Startups			★	★	★	
Support team	Dedicated structures for planning and developing all innovation processes in the company	IMO (focus on innovation management) and R&D (focus on research and development)			★	★	★	★
Customer Integration	Usage research, trials and visits to customers' environments	Studies based on customer complaints and use of services, field visits to clients and local authorities and forums with opinion formers		★		★		
Joint development	Collaboration with objective of reaching a certain public or market	Connected house, IPTV over Gpon, Music MVNO, MDN		★			★	v

Open innovation maturity level

The challenges pointed out in interviews are directly related to focus and execution capacity. Although we already have some internal areas totally focused on innovation (innovation management and R&D), the company still needs a greater internal alignment regarding the innovation model, mainly open innovation, as well as its main paradigm shifts. According to one of the interviewees: “There is already a very favourable climate for innovation in our company, where people are willing to participate and collaborate, have knowledge and some financial contribution available, because company has been able to build this over time. But for OI practice, it still needs changing mind set at all organization levels.”

In line with innovation maturity dimensions described by Enkel, Bell and Hogenkamp (2011), pro-innovation climate was a consensus point among respondents, but opinions diverged on topics “capacity to forge partnerships” and “internal processes for innovation”. In figure 2, each interviewee is identified by codes E1 through E5. Executives whom works directly with innovation process are identified by E1, E2, E3 and professionals E4 and E5 are responsible for marketing and strategy in Alpha.

Figure 2. Dimensions for maturity in open innovation

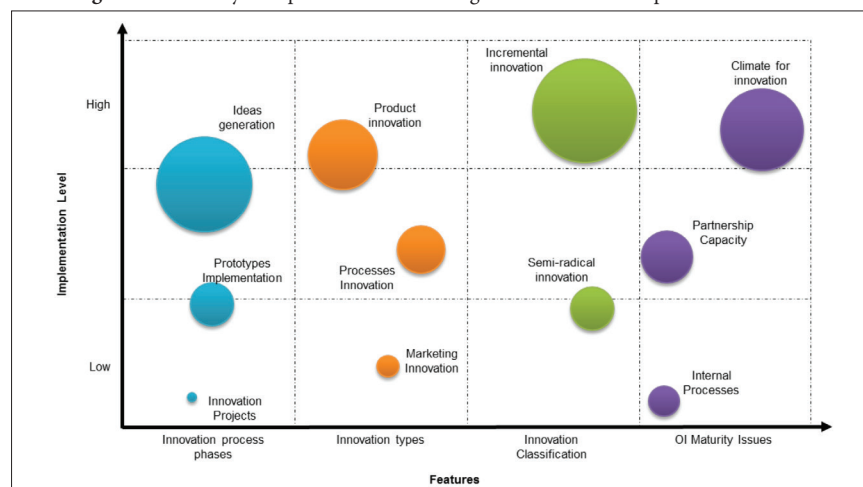
When evaluating a score from 0 to 5, with maximum score means best evaluation, each interviewee can judge Alpha ability to adopt OI as a model of innovation management. Assigned values were focused on average scoring, with a favorable climate for innovation as the best evaluated dimension and internal processes with lower evaluation. It is interesting to note that respondents' evaluations about innovation

processes were more rigorous, possibly because they experienced more recurring difficulties in innovation execution. Median marks given by marketing executives lead to deduction of a possible distance from these areas with processes related to innovation.

Regarding OI implementation challenges, issues related to internal culture were mentioned, where it is necessary to unlink innovation actions from traditional model that Alpha conducts its business, thus giving greater flexibility, openness to risks and stimuli for innovation proposals. Based on these statements, it can be inferred that critical assessment attributed to “internal processes” may be linked to aspects of company’s culture that are still based on internal policies and decisions with very short-term visions, low risk appetite and high degree of control and governance. The same confirmation can be made for “establishment of partnerships” that may be limiting in internal culture of being “major shareholder” or “determine final decision”. Some of these challenges have already been pointed out by Mortara and Minshall (2011) when they affirm that impulse to adopt OI is strongly related to organizational culture, thus reinforcing the conclusion that top management plays a fundamental role in implementation of OI management model.

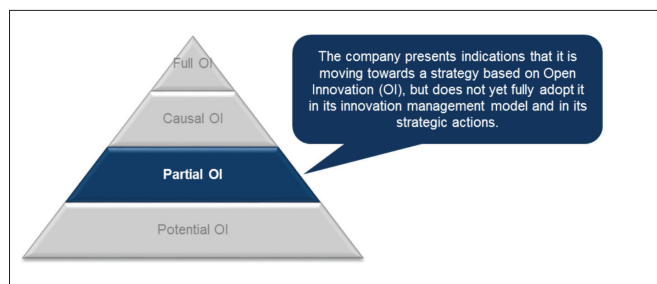
Here it is given an overview interviews data collected, visual observations of headquarter on-site visit, as well as documentary surveys carried out during entire period of data collection. Figure 3 shows a characterization based on the interpretation of the obtained data. The size of the bubbles in the graph represents the intensity of the action for each observed characteristic. It is possible to observe in Figure 3 different aspects that characterize the current stage of innovation practice in Alpha company. It is noted that Alpha has a high and medium-high degree of implementation for issues such as idea generation, product innovation, incremental innovations and a good innovation climate. But it has a medium to medium-low implementation level for aspects such as prototyping, process innovation, semi-radical innovation and ability to establish partnerships. Innovation development and commercialization, position and paradigm innovations, disruptive innovations and internal processes have a low implementation degree in Alpha, thus being important pain points to be taken care and worked on internally. This characterization does not denote absence of “closed” innovation or open innovation processes in company studied or that takes merit of actions implemented to date, but points out gaps that need to be worked out if Alpha wants to effectively increase its competitiveness in its market through OI.

Figure 3. Summary of Alpha features according to innovation conceptual classifications



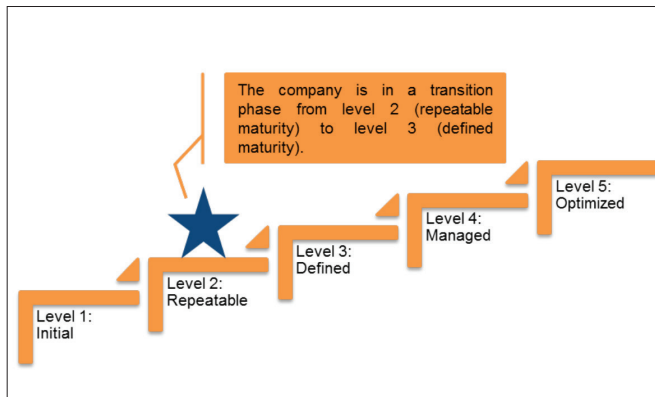
In this study, it was possible to observe that Alpha company has traced an evolution path in value generation through innovation processes. Therefore, it is important to evaluate that Alpha OI management maturity level (Figure 4), which presents classification obtained regarding degree of company’s innovation strategy openness.

Figure 4. Open innovation strategy classification for Alpha



It is observed that although it is not explicitly managing its innovation in an open way, Alpha fits as having a partial openness innovation strategy. This means that Alpha has partially formalized OI routines and processes, a possible indication that company is moving towards an OI strategy, but not being able or willing to implement it in its strategy.

Using model proposed by Enkel, Bell and Hogenkamp (2011), Alpha can be classified as “Level 2: Repetitive” in OI maturity and excellence (Figure 5). It shows that company needs to expand aspects such as partnerships, as well as formalization and improvements in internal processes as discussed previously.

Figure 5. Alpha maturity in open innovation

This classification was obtained by average of interviewees evaluations from which a maturity level of 2.5 was reached. Thus, based on data collected, it is observed that Alpha is already initiating a transition process to OI maturity level 3, once one that has in its innovation roadmap initiatives focused on partnerships expansion and establishment of procedures and policies for knowledge and technologies input and output.

Impacts on competitiveness

Since innovation is part of company's strategy and there are some indications of partial OI adoption by Alpha, it is hoped to verify positive impacts on company competitiveness. Table 2 presents some examples of innovations as well as the characterization of it according to Norman and Verganti (2014) and type of impact observed in company's competitiveness.

It was checked that great majority of innovations mentioned by interviewees refer to incremental innovations. In some of them, company established a partnership for innovation development, mostly used its internal R&D as main technology provider. Although there are no links between examples identified with direct OI practices, such innovations have contributed to increase company's competitiveness, either by reducing costs or increasing revenues, per Freeman and Perez (2000). It is also noted that Alpha has some occasional efforts of semi-radical innovation that were also essential to improve company operational efficiency (cost reduction) or to generate new revenues through innovation in business model of mobility services. But neither in interviews and observations made during visit to company headquarter nor in research on complementary documents, no examples of radical innovations were reported or identified.

Table 2. Innovations features and impacts on Alpha competitiveness

Innovation Features	Firm initiatives	Competitiveness impact		Analysis and validation
		Cost Reduction	Revenue Increasing	
Market-Pull innovation (incremental)	Mobile App, IVR, Voice Recorder, TAM, Pre-paid platform, SVAs, IPTV over Gpon, ICT services	✓	✓	It uses Internal R&D and some partnerships to develop the innovations. However, Alpha uses existing technologies and business models. Predominance of incremental innovation in products and processes.
Technology-push innovation (semi-radical)	Multi-service Platform	✓	✗	Developed an integrated services platform based on open source that provides numerous services now provided by the company. The example required of R&D for being new technology. The observed case refers to a process innovation with a semi-radical characteristic.
Meaning-driving innovation (semi-radical)	New mobile services	✗	✓	Taking advantage of a legislative guideline, company opted for a business model in one of its services offered to market which allowed it to double customer base in the last two years. Implemented a new business model despite using existing technology, thus characterizing a position innovation.
Technology Epiphany innovation (radical)	Not found	✗	✗	No cases of radical innovation have been observed or reported.

Conclusions

Present study about open innovation and competitiveness aimed to understand in depth the relevance of innovation process to firm's competitiveness, as well as to assess innovation practices adopted by Alpha company. It was observed that Alpha has a formal alignment

between innovation and strategy, since innovation is part of organization strategic objectives and it has specific performance indicators that are measured and monitored periodically. Company did not disclose amounts spent on innovation, but main sources of funding for innovation actions come from legal subsidies and national edicts which encourage innovation in Brazil.

Regarding OI practices, Alpha has evolved in recent years its innovation management processes. Although not explicitly using OI, indirect practices have been identified that are focused on technologies absorption through partners, suppliers, universities and technology research centres. OI processes are partially implemented, and technologies output (inside-out OI process) is still at a very embryonic stage in the company. It was also observed that there are limited or non-existent participation initiatives in consortia, licensing of intellectual property, venturing or spin-outs, which potentiates a relevant limitation in practical adoption of OI.

It was also verified positive impacts of innovation actions on Alpha competitiveness. From 2008 to 2013, about US\$ 30 million were saved through technological innovations. Most of them were product or process innovations, incremental and developed by internal R&D or with some collaboration from a few partners and universities. In this case, main challenges are to mature open innovation process, giving more focus and execution capacity, as well as refining internal processes and improving partnership relationships. OI implementation challenges should also get attention with aspects related to internal culture, where it is necessary to unlink innovation from Alpha traditional management model, thus allowing greater flexibility and incentives for innovation proposals and partnerships. Possibly limitations found in “partnership capacity” and “internal processes” may be linked to aspects of the company culture.

In general, when looking at innovation practices, Alpha mostly focuses on incremental product and service innovations, with limitations on prototypes and projects execution. This characterization does not denote absence of OI processes, but leads to a classification of “partial” opening of innovation processes. Despite this, company has a favourable climate to foster innovation. In another measurement, it was possible to verify that Alpha has a medium maturity level in open innovation, classifying it as “Level 2 - Repetitive”. However, it can be said that due to several internal actions in progress, Alpha is in a transition phase to a higher maturity level with greater capacity to establish and manage internal partnerships and processes more closely to needs of OI management model.

In this way, it can be concluded that even with partial OI practices adoption it is possible to develop innovative actions that increase competitiveness such as company studied, but it is up to the company to have the option by open innovation as a strategic pillar and priorities for its implementation. This study case concluded that even with a partial degree of openness and an intermediate level of maturity, open innovation put into practice can support technological development and increase business competitiveness in its activity sector.

In order to assist Alpha and other organizations that are in similar OI management maturity stages, this study makes following recommendations: (i) establish actions focused on the inside-out process through venturing, licensing of intellectual property and Involvement of non-R&D employees in innovation initiatives; (ii) promote collaborative actions with clients and external actors involvement; (iii)

establish studies and routines of technology analysis and evolution (technology forecasting); (iv) define an exclusive fund for investment in innovation; (v) establish formal partnerships processes for technological development; (vi) reassess internal processes that allow for greater fluidity of ideas, prototypes and innovation projects implementation in a way that is not linked to the operation and routine of company; (vii) remove radically from organizational culture the myth that nobody cannot make mistakes, but mistakes are allowed if done and revised quickly; (viii) ensure that neither top management nor short-term objectives will interfere in present and future innovation initiatives; (ix) seek initiatives through partnerships, spin-offs, ventures and effectively bring disruptive innovations to the organization.

As limitations, this study should not be generalized because it is a specific case study in a ICT firm. Anyway, it serves as a reference for good practices and how to evolve a company's innovation processes towards open innovation. As future work, other actors of innovation ecosystem such as partners, ICTs and universities can be inserted, in order to widen scope of concepts and practices discussed. In addition, a comparative analysis with firms from other sectors would be relevant and how these have used open innovation in favour of their competitiveness.

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